Science communication as collective intelligence: a programme and manifesto

Structure after voting in spreadsheet

*Note: no one is assigned at the moment to Introduction, as it would be good to revisit it once our sections are more fleshed out.

Introduction

- *Scope of science communication - normative judgement*
- *Scope of science communication - communication and education*
- *Knowledge is communal*
- *We live in a society in which there is a pervasive sense of entitlement to have an opinion about anything and to form that opinion based on anything we want, whether there is any evidence supporting it or not. We need to consider this context in the manifesto.*
- *Lone wolves get the attention from the media*

RED Group: Why and what is collective intelligence?
CLA: **Stephan Lewandowsky**
Contributing authors:

Stefan Herzog
Helen Fischer
Christian Gilde

The points below were brought up in the workshop under each general theme (theme in bold, section underlined). They are listed here to aid you in writing about the manifesto issues.

Why Collective Intelligence?

The landscape of SciComm today (and the problems for science)

- Tackling the false equivalence and the illusion of "balance"---the need for weighting communication and how much support is actually behind it.
- This means the WEIGHT of evidence needs to be communicated, not just the evidence itself (as one piece of information)---this needs consensus of the collective to display the scientific weight around it
- large-scale systemic factors appropriating/reinterpreting/ and using science
- Single individual communicating can easily misrepresent consensus OR fail to be perceived as misrepresenting consensus.
- We need to combat Backlash and lobby groups
- evidence and patterns of ideology-motivated conduct in the sciences
- mainstream or fringe dichotomy, position relativity

- distinguish between communication and PR
- polarization levels
- · Limitations of traditional models that undermine fundamental principles
- *· Misinformation is co-ordinated: therefore scientific communication needs to be as well*
- *what are the sources of expertise and the roles of experts ??*
- *identify political threats to science*
- *· this is closely related to the difference between a deliberate democracy and a radical democracy (in the latter, individuals and their decisions are the most important, in the former, informed arguments are valued over less informed ones)*
- *o Reaching the ideologically opposed*
- *· Technology has moved on: no longer are scientists "selected" based on existing power structures/hierarchies. Anyone on Twitter can speak out.*
- *special topics: consensus (4), certainty, empiricism + evidence*
- *o Dealing with egos vs. expertise*

<u>What is Collective Intelligence?</u>
Key characteristics of collective intelligence

- o Definition of collective intelligence
- *Scicomm as CI should develop a common representation of scientific knowledge*
- *community-driven knowledge systems*
- *involvement of the public?*

How do scientists contribute to collective intelligence

- already existing forms of "collective intelligence"
- · Examples of successful CI in scicomm from the pandemic (Indie SAGE, SciBeh c19vax handbook)

Boundary conditions: what is NOT CI?

ORANGE GROUP: "Things we need" A – Mechanics to accommodate nuance & disagreement + incentives
CLA: **Ulrike Hahn**
Contributing authors:

Sune Lehmann
Joshua Tenn
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The points below were brought up in the workshop under each general theme (theme in bold). They are listed here to aid you in writing about the

manifesto issues. Please also consider these two elements below, which did not fit neatly into a single theme, but may deserve a mention in the subsection:

- *Design principles to consider: Effective comms needs experiential component*
- *Design principles to consider: Human element is important*

Things we need to build and sustain the system

mechanics of accommodating / allowing for nuance, disagreement

- Scicomm as CI should be Epistemically diverse--- Collective intelligence favours consensus, but also comprises or mere "averages". How do we represent and communicate (healthy) disagreement or just diversity of views in a collective intelligence version of science communication?
- o Layer the system to visualize arguments separate from identities
- tracing scientific arguments (how ??)
- *o Self-critical: committed to examining biases and problematic self-perceptions, reflections.*
- *o Discuss ideas, not people*
- *o Using AI agents in clever ways to either have something that helps us to reduce certain biases in group discussions, get away from polarisation, but also how we can rethink typical assumptions and tendencies - also provokes us to look at things we wouldn't normally look at.*
- *o ML to visualise argument networks.*
- *communication of ideas/arguments between scientists*
- *We need to achieve Respectful communication*
- *· We need to know what one person understands of a term/piece of evidence and know what another person understands of the same term/evidence and then develop a common language*
- *science platforms*

public examination of incentive structures

identify current misaligning scientific work incentives

- researcher career-related incentives for public communication (early, mid, high-end)
- how to motivate listening to, engaging with, platforming, or amplifying others' ideas
- o No system to credit all different sorts of contributions
- o How to give proper credit
- o Quantifiying and recognising valuable contributions that are NOT papers
- o Lack of credit for producing output that supports good science (as opposed to "interesting" science)---e.g., open data
- o Building consensus is at odds with shouting about own big idea--- we need to shift so people amplify the best ideas instead of trying to push their own
- avenues for scientists to be self-critical

- provide professional development in the intersecting fields of media and science
- · Others may not be incentivized to understand how we are using the language in scientific discourse
- o Policy advice vs. politics
- *Dangerous to mix promoting and informing - we must distinguish between these two cases, otherwise it carries great risk (how to draw the line here?)*

GREEN GROUP: “Things we need” B – ways to evaluate evidence strength and consensus
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Paul Hanel
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Niccolò Pescetelli

The points below were brought up in the workshop under each general theme (theme in bold). They are listed here to aid you in writing about the manifesto issues. Please also consider these two elements below, which did not fit neatly into a single theme, but may deserve a mention in the subsection:

- *Design principles to consider: Effective comms needs experiential component*
- *Design principles to consider: Human element is important*

evaluating strength (reliability)

- Scicomm as CI should support ability to visualize such aggregated evidence
- provide access to processes of evidence synthesis (evidence - - method - - > conclusion)
- standards for communication involving uncertainty in evidence —> providing oversight of evidence as well as material and procedures concerning its quality
- guidelines for university evaluation criteria and policy-maker use
- *strength of consensus*
- *o using AI to identify collective intelligence trends and patterns*
- *standards for assessment*
- *Scicomm as CI should Verify credible sources of information*

Scicomm as CI should enable evaluation of consensus (ideally rapidly)

- (Chicago business/economics school example): panel of experts which vote on individual propositions and can comment and then at end the majority – aggregated. Can see comments as well as overall consensus
- *Scicomm as CI should Support evidence aggregation---away from one-off papers, towards generating data and inferences that systematically and objectively build on each other, synthesise evidence from disparate sources*
- *"accumulation machine" + ML evidence synthesis*
- *Sci Comm as CI should develop a shared consciousness of scientific method*

BLUE GROUP: "Things we need" C –
Contributions of the public & Transparency
CLA: **Katy Tapper**
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Sunita Sah
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Sameer Alladin

The points below were brought up in the workshop under each general theme (theme in bold). They are listed here to aid you in writing about the manifesto issues. Please also consider these two elements below, which did not fit neatly into a single theme, but may deserve a mention in the subsection:

- *Design principles to consider: Effective comms needs experiential component*
- *Design principles to consider: Human element is important*

o Can the public contribute to collectively intelligence scicomm? ---patient-driven initiatives? (long covid, HIV/AIDS)

- Can other organisations (e.g., fact checker?) contribute to scicomm as CI?
- Design principles to consider: Engage with citizen science, two-way communication
- *How to train the general population to think critically and check their sources of information for scientific research. Example: https://shareverified.com/pledge-to-pause/*
- *· To talk to the public we need a shared language. We also need a shared language between disciplines.*
- *o Most languages translate evidence as proof which implies no error in inferences but in English implies possibility of false evidence – issue in public may be confusion in how we define support for any statements we make.*

Transparency:

- Design principles to consider: Transparency should underlie any system we design
- o Transparency extends to values and motivations
- research funding transparency
- o Transparency, communicating values and motivations
- · Transparency and open science ? (or maybe different section)
- *o Transparency and openness of IDEAS and EVIDENCE---these should be open to scrutiny (does not mean individuals should be abused or attacked)*
- *o Role of preprints*

PURPLE GROUP: “Challenges & open questions” A – Drawbacks of transparency & managing bias/vested interests

CLA: **Dawn Holford**
Contributing authors:

Hendrik Bruns
Maria Petrescu
Caroline Orr
Sonia Boender

The points below were brought up in the workshop under each general theme (theme in bold). They are listed here to aid you in writing about the manifesto issues.

Key challenges/open questions
possible drawbacks of increased public transparency

- How to maintain some gatekeeping of information while not gatekeeping access or opportunity
- potential for misuse
- Maintaining transparency but not just letting every opinion in
- penalties for misconduct
- But we could make it clear where the values lead, and get public to weigh how much they support certain opposing propositions and lead them to their conclusions? E.g., we can believe in 2 conflicting things, but need to make a decision at some point about which path to take in the knowledge that the other thing then needs to get dropped. Can we have transparency about that?)
- *"exposing"/sharing scientist backgrounds*
- *manipulation, what aspects are susceptible to manipulation?*

Managing bias and vested interests

- Implicit (bias?) and conclusions people come to – disagreement stems from different values
- Scientists' blind spots, own biases---education alone is not the answer
- *accountability*
- *How do we manage responsibility and attribution in collective sci comm*
- *access, openness for input,*
- *Needing to uncover disinformation lobby groups masquerading as CI*
- *counteracting AI-based manipulation campaigns and deepfakes*

YELLOW GROUP: "Challenges & open questions" B – explaining scientific knowledge production & consensus and retaining the human element in CI

CLA: **Miso Demko**
Contributing authors:

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Philipp Schmid

The points below were brought up in the workshop under each general theme (theme in bold). They are listed here to aid you in writing about the manifesto issues.

Can we explain how scientific knowledge production works? What might this accomplish??

- o Aggregating evidence: what is actually right level of aggregation you want to make available to people – wonder whether problems we make in policy system and supporting decisions and way we communicate – we give too highly aggregated evidence – maybe think about collective intelligence projects that try to track evidence
- role of science and meaning of scientific findings among the public
- *o Role of preprints*
- *Can we have effective Communication of uncertainty*
- *o Can scientists <> scientist discourse take place on the same level as scientist <> public discourse? How to set ground rules for the use of language?*
- *Setting the research agenda for SciComm: Programme on communication on science – lots out there but information scattered across types of journals and disciplines and issues – covid climate change, vaccines – must be common patterns – start with research most common issues coming up*
- *"authorship"*
- *o Public needs to be better educated vs. scientists need to communicate better (or somewhere in between?)*

consensus-as-proof

- o Distinguishing consensus from groupthink

Retaining the human element in a CI platform

- o Communication needs a human element---how to square that with dissociating ideas from identity?
- *Design principles to consider: People use social networks not to engage with argumentation, but to be part of a group and social interaction. Group identity is important*
- "common representation platform" for scientific knowledge
- o Necessity of wider involvement from global south in sci comm as Collective intelligence
- research the potential value of co-creation
- *o Coordination issue—the value of platforms lie in how many people use it. Ultimately, without users, it will fail.*
- *argument map "superlayer"*

<< NEW STRUCTURE AFTER VOTING ENDS HERE. NEXT PAGES ARE EARLIER ITERATIONS PRE- AND POST-WORKSHOP >>

Please note: this is a skeleton of a potential structure of the proposed manifesto, to give an idea of the direction it could take. ***At the bottom the topics for discussion that you have submitted during the registration process are included.***

Original skeleton draft:

1. Why collective intelligence?

Communication to the public

- Why is the traditional lone wolf model not enough?
    - Social media disinformation
    - Well funded anti science campaigns
    - Relationship to the press
    - Diversity of opinions among scientists during rapidly evolving science

Communication to policy makers

- limitations of traditional bodies of expert advisers
    - Transparency
    - Selection bias
    - Slow pace

- Where has the crisis seen trends to collective intelligence?
    - Ad hoc bodies created by professional societies
      -> Indie SAGE etc.
    - What has been good/bad about these?
- SciBeh's vaccine communication handbook and Wiki
- Long covid: patients reporting to researchers to learn about this
- Lab leaks people, collective coming together to spot "malfeasance" in research

>> Superficial participatory discourse
>> Distinguished by transparency
>> Responsibility of actions taken by the collective and people in it

2. What *is* collective intelligence?

Key characteristics

What does it have to offer for science communication beyond "lone wolf" or traditional "expert model"

3. What do we need to build and sustain this?

- People
- Tools
- Procedures

Possible alternative structure here (instead of people, tools, procedures) would be:

- Consensus
- Communication
    - To policy makers and journalists
    - To the wider public
- Incentives
    - At the university institutional level (e.g. re promotions)
    - At the wider societal/policy level (re university rankings, REF etc)

4. Key challenges and open questions

Miso's suggestions:

topics (of consesus and uncertainty) from the polls - additional topics for discussion

What does CI have to offer to sci comm?
identify political threats to science
personalize the public
distinguish between communication and PR
research the potential value of co-creation
provide professional development in the intersecting fields of media and science
special topics: consensus (4), certainty, empiricism + evidence

How do we build and sustain systems that support the role of CI in sci comm?
community-driven knowledge systems
"authorship"
public examination of incentive structures
bureaucracy peer-review
profile review
research funding transparency
accountability
penalties for misconduct
what are the sources of expertise and the roles of experts ??
access, openness for input,
potential for misuse
involvement of the public

Non-exhaustive, possibly repetitive of the above list of topics extracted from workshop chat discussion [delete this section during writing]

science in problem solving
problems entail:

- urgency
- risk (mutually reinforcing)

scope:
i. C & E relations
ii. normative judgment

viability of “self-education kits”, to foster critical thinking

how to brand science? the scientific method?
“follow-through campaigns”
division of labor in science + training

evidence and patterns of ideology-motivated conduct in the sciences
manipulation, what aspects are susceptible to manipulation?
polarization levels

provide framework of scientific field self-mediation
avenues for scientists to be self-critical
identify current misaligning scientific work incentives
researcher career-related incentives for public communication (early, mid, high-end)

standards for assessment
    research on peer-review efficacy/reliability
    strength of consensus

consensus-as-proof
    evaluating strength (reliability)
    mechanics of accommodating / allowing for nuance, disagreement
    mainstream or fringe dichotomy, position relativity
    consensus vs groupthink
    pro/anti group composition

historical record demonstrating that the scientific method is reliable and beneficial, and identifying the proven and sustained threats against it

science platforms
“common representation platform” for scientific knowledge
identifying and addressing special issues
argument map “superlayer”
possible drawbacks of increased public transparency
“exposing”/sharing scientist backgrounds

Can we explain how scientific knowledge production works? What might this accomplish??
“accumulation machine” + ML evidence synthesis
provide access to processes of evidence synthesis (evidence - - method - - > conclusion)
standards for communication involving uncertainty in evidence —> providing oversight of evidence as well as material and procedures concerning its quality

Report on the Condition of Science in the Media
foundations of scientific inquiry, scientific push(back) against (media) biases
is audience critical thinking enough??
science vs media cycles
public-media interactions, journey of information

communication of ideas/arguments between scientists
tracing scientific arguments (how ??)
how to motivate listening to, engaging with, platforming, or amplifying others’ ideas
guidelines for university evaluation criteria and policy-maker use

markets for hq information ??
dissemination ??
what do audiences believe and want??

already existing forms of “collective intelligence”

self-organizing characteristics, “de facto truths”
how do spontaneous authorities emerge in communities??

to further research:
the scientific research process
role of science and meaning of scientific findings among the public
survey scientists on existing approaches to ways of communicating

Dawn’s thoughts on structure below:

Introduction: Why the Manifesto? (sum up points from different sections?)

SECTION 1---The landscape of SciComm today (and the problems for science)

- large-scale systemic factors appropriating/reinterpreting/ and using science
    - Examples of misappropriation here?
- “we need to recognise the impact on distortion and trust on science – it is maybe the legacy of pandemic to resolve this”
- Single individual communicating can easily misrepresent consensus OR fail to be perceived as misrepresenting consensus.
- Technology has moved on: no longer are scientists “selected” based on existing power structures/hierarchies. Anyone on Twitter can speak out.
- BUT this brings its own inherent problems, and power imbalance does not go away.
- Need to challenge the power structures that keep science closed and distort evidence-based consensus
- Tackling the false equivalence and the illusion of “balance”---the need for weighting communication and how much support is actually behind it.

- Misinformation is co-ordinated: therefore scientific communication needs to be as well

- We live in a society in which there is a pervasive sense of entitlement to have an opinion about anything and to form that opinion based on anything we want, whether there is any evidence supporting it or not. We need to consider this context in the manifesto.

- this is closely related to the difference between a deliberate democracy and a radical democracy (in the latter, individuals and their decisions are the most important, in the former, informed arguments are valued over less informed ones)

SECTION 2---Fundamental principles about the role of science (and why it suits a collective endeavour)

- We need to establish role of science as a collective---what do the majority of scientists believe that science should be?
    - Knowledge is communal
    - Transparency and openness of IDEAS and EVIDENCE---these should be open to scrutiny (does not mean individuals should be abused or attacked)
    - Transparency extends to values and motivations
    - Self-critical: committed to examining biases and problematic self-perceptions, reflections.
    - Humility?
    - Deliberate democracy: arguments and evidence count more than opinions (radical democracy position)
    - This means the WEIGHT of evidence needs to be communicated, not just the evidence itself (as one piece of information)---this needs consensus of the collective to display the scientific weight around it
    - Discuss ideas, not people
- Limitations of traditional models that undermine fundamental principles
- Transparency and open science ? (or maybe different section)
- Why is comms important: research is public-money funded

SECTION 3---What is collective intelligence, and what should a collective intelligence system do?

- Key characteristics?
    - Definition?
- Where does it come from?
    - Scientists
    - Public? ---patient-driven initiatives? (long covid, HIV/AIDS)
    - Other organisations (e.g., fact checker?)
    - Necessity of wider involvement from global south
- What it should do
    - Developing a shared consciousness of scientific method
    - Developing a common representation of scientific knowledge
    - Enable evaluation of consensus (ideally rapidly)
    - Support evidence aggregation---away from one-off papers, towards generating data and inferences that systematically and objectively build on each other, synthesise evidence from disparate sources
    - Ability to visualize such aggregated evidence
    - Epistemically diverse--- Collective intelligence favours consensus, but also comprises or mere "averages". How do we represent and communicate (healthy) disagreement or just diversity of views in a collective intelligence version of science communication?
    - Reduce redundancies
    - Increase trustworthiness and explainability?
    - Verify credible sources of information
    - Aggregating evidence: what is actually right level of aggregation you want to make available to people – wonder whether problems we make in policy system and supporting decisions and way we communicate – we give too highly aggregated evidence – maybe think about collective intelligence projects that try to track evidence

- Examples from the pandemic (Indie SAGE, SciBeh c19vax handbook)
    - The pandemic is the first time that the general public is being involved in the process of the science rather than just the product as the research is still ongoing---a chance to bring them on board
- Boundary conditions: what is NOT CI?

SECTION 4---Communicating as a collective: how do we do this effectively? (especially in a crisis situation)

- What is effective?
    - Communication needs a human element---how to square that with dissociating ideas from identity?
        - Value of anecdote vs. statistics (which is also a problem of weighting evidence)
    - Communication of uncertainty
- Responsibility and attribution
    - how can scientists working for governmental institutions engage with the media, without institutions having to worry about a non-unified message coming from their organisation?
- Respectful communication
    - To respect intelligence in others and their (in)ability to act and adapt in light of scientific information.
- Challenges to overcome
    - Dangerous to mix promoting and informing - we must distinguish between these two cases, otherwise it carries great risk (how to draw the line here?)
    - Backlash and lobby groups
        - Needing to uncover disinformation lobby groups masquerading as CI
        - Remaining relatable without inviting personal attack
    - Reaching the ideologically opposed

- Different political ideologies - cannot say they are right or wrong because they are different views. Values are not right or wrong.
- Implicit and conclusions people come to – disagreement stems from different values
- Protecting public health as priority during covid but different conclusions for someone interested in freedom or etc
- Not always clear when see these debates – political ideologies – fundamentally cant say right or wrong but different views

    - (But we could make it clear where the values lead, and get public to weigh how much they support certain opposing propositions and lead them to their conclusions? E.g., we can believe in 2 conflicting things, but need to make a decision at some point about which path to take in the knowledge that the other thing then needs to get dropped. Can we have transparency about that?)

- Distinguishing consensus from groupthink
- Transparency, communicating values and motivations
- Policy advice vs. politics

· Education vs. communication

- Public needs to be better educated vs. scientists need to communicate better (or somewhere in between?)
- there is a need to dispel the myth that info consumers need to 'educate themselves' extensively in order to understand information

  - How to train the general population to think critically and check their sources of information for scientific research. Example: https://shareverified.com/pledge-to-pause/

- Difficulty of educating self-critique (pushback, threat to identity)
- Scientists' blind spots, own biases---education alone is not the answer
- Dealing with willful misinterpretation---neither will help

- Labels will help them navigate this? Or some type of quality standards that might strengthen papers as well (quality sign). Although peer review is a great and highly valued process, this is kind of intransparent (who reviews, what their motivations are, etc.).

- Managing frustration of people who want certainty that (behavioural) science cannot give: “One challenge of science communication might consist in the fact that it may want to serve two goals at once: A: being persuasive to change people’s attitudes and beliefs via clear-cut confident messages and eventually misrepresenting the uncertainty around the scientific process, hypotheses and findings and B: communicating the epistemic uncertainty that characterizes science which may lower their capacity to change people’s minds.”

· Maintaining transparency but not just letting every opinion in

- How to maintain some gatekeeping of information while not gatekeeping access or opportunity
- Paywall barriers and technical terminology to access scientific content. How to simplify a complicated concept without losing meaning?

SECTION 5---Systems and design

· Design principles to consider

- Effective comms needs experiential component

- Human element is important

- People use social networks not to engage with argumentation, but to be part of a group and social interaction. Group identity is important

- Engage with citizen science, two-way communication

- Transparency should underlie any system we design

· Platform changes or overlays

- Layer the system to visualize arguments separate from identities

- Coordination issue—the value of platforms lie in how many people use it. Ultimately, without users, it will fail.

· The role of AI

- ML to visualise argument networks.
- Using AI agents in clever ways to either have something that helps us to reduce certain biases in group discussions, get away from polarisation, but also how we can rethink typical assumptions and tendencies - also provokes us to look at things we wouldn't normally look at.
- using AI to identify collective intelligence trends and patterns
- counteracting AI-based manipulation campaigns and deepfakes

· Incentives

- How to give proper credit
- Quantifiying and recognising valuable contributions that are NOT papers
- Dealing with egos vs. expertise
- Lone wolves get the attention from the media
- Publishing incentives---focused on citations (but at expense of rigour sometimes)---should journals showcase retraction rates?
- Lack of credit for producing output that supports good science (as opposed to "interesting" science)---e.g., open data
- No system to credit all different sorts of contributions
- Collective action problem? shared intentions of community, pledge of how they would like to act – kickstarter of behavioural change – fits into concept of collective desired intelligence
- Are scientists really inherently selfish and motivated by attention, or is science just drawing those who are into this sphere? (i.e., can we restructure science to be less attractive to those with big egos?)

- Building consensus is at odds with shouting about own big idea---we need to shift so people amplify the best ideas instead of trying to push their own
- Consider reputation and culture
- A lot of institutional accounts (e.g. universities) will tend to not focus on science communication at all - there is an idea of competition in the higher education sector; instead of promoting science communication they tend to focus on rankings. This can also occur in lab twitter accounts. PR-focused view.

- Platforms and channels
  - Role of preprints
    - (Chicago business/economics school example): panel of experts which vote on individual propositions and can comment and then at end the majority – aggregated. Can see comments as well as overall consensus

- Finding a common language
  - Can scientists <> scientist discourse take place on the same level as scientist <> public discourse? How to set ground rules for the use of language?
    - Translations showcase the issue as well: evidence = proof vs. evidence = support in different languages
      - Most languages translate evidence as proof which implies no error in inferences but in English implies possibility of false evidence – issue in public may be confusion in how we define support for any statements we make.
    - Others may not be incentivized to understand how we are using the language in scientific discourse
    - To talk to the public we need a shared language. We also need a shared language between disciplines.
    - We need to know what one person understands of a term/piece of evidence and know what another person understands of the same term/evidence and then develop a common language

- define public and scientific community what we mean proof, evidence, inferences, testimonial – all sorts of interchangeable terms when not synonymous

SECTION 6---Setting the research agenda for SciComm

- not sure we actually know what our natural tendencies are: what do we really do online? We need to be testing what different design features push us to do (scientists as well as public)
- Programme on communication on science – lots out there but information scattered across types of journals and disciplines and issues – covid climate change, vaccines – must be common patterns – start with research most common issues coming up
- Understand mechanisms better.
- What DO scientist believe are the norms and values of science?
- Investigating what "understanding" means
- Comprehension of science in politicized domains.

What challenges should we discuss? (Submitted by attendees, clustered into themes)

***These are by no means the only way we could group these, feel free to evaluate, debate, add your collective intelligence ;)**

1. Developing consensus

- Evidence aggregation

> Coordination problems and redundant information

> The problem of organizing information in a practical and useful way

> How to move away from publishing one-off papers and towards generating data and inferences that can systematically and objectively build on each other.

> How to synthesize evidence from disparate sources.

> How to visualize aggregated evidence.

> experimental science as a mode of knowledge production

- Establishing evidence—what is scientific?

> How to measure consensus among experts.
> Developing a shared consciousness of scientific method
> Developing a common representation of scientific knowledge

- Identifying problematic science

- Challenging ways of working
> Solitary thinking and working
> How to organize scientists.

- Epistemic diversity
> Collective intelligence favours consensus, but also comprises or mere "averages". How do we represent and communicate (healthy) disagreement or just diversity of views in a collective intelligence version of science communication?
> the role of science communication in reducing the gaps between north-science and south-science.

2. Communication while reaching consensus / communicating science in a crisis situation

- Debunking misinformation
> Education to recognize false narratives, Institutions to control them
- **verifying credibility of sources of information**
- **dealing with confirmation bias**

> Misconceptions amongst people for not taking vaccines > working with fact checker organisations (e.g. First Draft)

- How to communicate consensus

> How to more effectively communicate scientific consensus on a given issue: A prominent example is climate change, but I think more could be done for COVID-19 (e.g., with respect to the scientific consensus on relatively low long-term risks).
> Shortcomings of traditional model of science communication.
> Arguably, the way information is presented is as important as what is being disseminated.
> incorporating the growing body of evidence-based behavioral research on the topic of information presentations,

including cognitive biases, memory, framing effects, social media sharing concerns, infographics, numerical presentations, etc.

> Effectively communicating risk during crises

> Data presentation, narrative use

> The need to not appear paternalistic and condescending in communications with the public.

> How we can communicate our research findings in a way that they are easily understood.

> How as a collective we can decrease public perceived uncertainty (such as uncertainty associated with climate research while the evidence was actually very solid) - through strategies such as communicating scientific consensus or others

> how to do sci-comm as collective intelligence at a proper pace and across timezones (e.g., during COVID)

- Transparency and open science: what is needed?

> replicable protocol exchange, citizen science.

> The contributions of science communication to the development of the open science.

> What is the role of preprints in contested discourse? E.g., might the preprint system be counter-productive when the research is highly contested?

- Incentives to communicate well / engage with media etc.

> How this can be made attractive for early-career researchers

> How to communicate to the broader science community that we all have a responsibility and an ethical obligation to be aware of how we craft and disseminate information

> how can scientists working for governmental institutions engage with the media, without institutions having to worry about a non-unified message coming from their organisation?

- Managing science/policy gaps

> how we as researchers can use informative effect sizes to allow policy makers to more easily compare two or more studies on the same topic (e.g., for cost-benefit analysis).

> distinguish policy advice and politics

-Platforms and channels

> How should individuals and research groups use social media to promote their work, if at all?

> how to integrate collective intelligence in sciComm into a public health institute -- with potentially lengthy feedback loops and clearance processes

3. Responsibility and attribution

- Who does a scientist represent when commenting on a platform?
> Communication on behalf of your institute vs your expertise
> speaking as an independent scientist while being associated/affiliated with an institute
> Scientists arguing with each other, especially in public forums such as twitter.

- Protection from targeted backlash
> How to support those who get a lot of backlash from special interest groups.

- Defining and valuing contributions
> How to quantify and recognise valuable contributions to the scientific enterprise, in all their forms
> how to give proper credit (e.g., licenses but also more generally when implementing ideas from others)
> related: how to deal with scientists communicating based on ego, etc, not expertise

- Values influencing scientists' recommendations
> individuals are more motivated to align with their cultural in-group than what is in the best interest of the collective well-being when science topics are--often erroneously-- wedded to unrelated political agendas
> How to make the values influencing scientists' recommendations more transparent.
> how to effectively counteract public polarization about issues that from a scientific viewpoint, are well-researched, such as the effectiveness of vaccine

4. Non-scientist involvement

- Addressing barriers to access (e.g., knowledge, trust, polarisation)

> Paywall barriers and technical terminology to access scientific content. How to simplify a complicated concept without losing meaning?

> Comprehension of science in politicized domains.

> Ill-calibrated individual-level confidence

> there is a need to dispel the myth that info consumers need to 'educate themselves' extensively in order to understand information

> To respect intelligence in others and their (in)ability to act and adapt in light of scientific information.

> How to maintain some gatekeeping of information while not gatekeeping access or opportunity

> The roles of biology/emotion. social influence, and identity in rationality. Science communicators persistently neglect to acknowledge the pervasive influence these play in how the public engages with and is influence by our narratives.

> Refining system 2 "critical thinking" capacities

> Investigating what "understanding" means

- Citizen science & what is the role of the public?

> How to effectively train e.g. journalists in adequately reporting scientific evidence in balanced ways; to avoid for example an overly strong focus on sceptical views, if those represent a scientific minority

> Is there actually any research about how journalists and other science communicators search, select and then communicate about science that could help us better understanding these issues?

- **How to train the general population to think critically and check their sources of information for scientific research. Example: https://shareverified.com/pledge-to-pause/**

- Cross-cultural variation?

> How to communicate science to groups with negative perceptions of science, e.g. certain minority groups, religious groups that are anti-science

- truth and trust crisis

> Content trustworthiness and results explainability

> effective ways to communicate uncertainty not to the detriment of trust into scientists or other communicators

5. The role of machine/artificial intelligence

> what role machine/artificial intelligence could have in collective intelligence and how exactly this is achieved.

- **using AI to identify collective intelligence trends and patterns**
- **counteracting AI-based manipulation campaigns and deepfakes**

> Communication through networks and online algorithms as filters and sieves.

> AI algorithm bias

- **confirmation bias**

BONUS: How do we get this manifesto out there?

Specifically:

“Media theory and audience development. The manifesto is a great concept, but without contextualizing its purpose within broader society, how it will be discovered and interpreted, and whats the role of said collective intelligence is in the functioning of society, it seems unlikely to be effective.”